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### III. $\therefore 11\frac{1}{3}\%$ = rate of interest paid.

Solved with varying results by *M. A. Gruber, G. B. M. Zerr, J. E. Baldwin, H. C. Whitaker, H. W. Draughon, I. L. Beverage, and W. F. Bradbury*. Some of the contributors used compound interest.

#### 14. Proposed by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

A bank by discounting a note of 7% receives for its money a discount equivalent to  $7\frac{3}{4}\%$  interest. How long must the note have been discounted before it was due?

Solution by the Proposer.

$7\frac{3}{4}\% - 7\% = \frac{3}{4}\%$ .  $7\frac{3}{4} : \frac{3}{4} = \$1.00 : \$\frac{3}{8}$ , the interest of \$1.00 for the required time at 7%.

$\$1\frac{1}{8} : \$\frac{3}{8} = 12 \text{ months} : 16\frac{2}{3}$  months.

$\therefore$  Time =  $16\frac{2}{3}$  months = 1 year 4 month  $17\frac{1}{3}$  days.

Also solved with different results by *H. C. Whitaker and P. S. Berg*.

#### 15. Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Logan County, Ohio.

Supposing the town *A* to be 30 mi. from *B*, *B* 25 mi. from *C*, *C* 20 mi. from *A*, where must a house be erected to be equally distant from each of the towns?

Solution by W. A. GRUBER, War Department, Washington, D. C.

The radius of the circumscribed circle of the triangle formed by drawing *AB*, *BC*, and *AC*, is the *distance* required, and the center of this circle is the *place* for the erection of the house.

From Geometry or Trigonometry, we get

$$R = \frac{abc}{4\sqrt{s(s-a)(s-b)(s-c)}},$$

in which *R* represents radius of circumscribed circle of a triangle in terms of the sides of triangle.

Substituting for *a*, *b*, *c*, and *s* [ $=\frac{1}{2}(a+b+c)$ ], the respective values 25, 20, 30, and  $37\frac{1}{2}$ , we have

$$R = \frac{25 \times 20 \times 30}{4\sqrt{37\frac{1}{2} \times 12\frac{1}{2} \times 17\frac{1}{2} \times 7\frac{1}{2}}}, \text{ which reduced, becomes}$$

$$R = \frac{40}{\sqrt{7}} = \frac{40\sqrt{7}}{7} = 15.11857 \text{ mi.}$$

Also solved by *H. C. Whitaker, G. B. M. Zerr, Seth Pratt, J. F. W. Scheffer, J. W. Watson, and P. S. Berg*.

## PROBLEMS.

#### 22. Proposed by E. S. Loomis, A. M., Ph.D., Professor of Mathematics, Baldwin University, Berea, Ohio.

*A* borrows \$1000 from *B* for 10 years, on which he pays 4% semi-annually.

*A* immediately loans the \$1000 to *C* for 10 years, who agrees to pay to *A* \$12 $\frac{1}{2}$  on the first of each month for 120 mos. or 10 yrs., at which time the whole debt is considered canceled, *C* no longer being, in any way, indebted to *A*. Upon the receipt of each of the \$12 $\frac{1}{2}$  payments made by *C*, *A* immediately relays it to *D*, *E*, *F*, etc., upon the same conditions as he loaned the \$1000 to *C*; at the end of 120 mos. all who are indebted to *A* pay up in full all due him, and he (*A*) pays *B* the principal, all interest having been paid when due.

Query: How many dollars has he in hand?